Skjraasen, Jon Egil; Nash, Richard D. M.; Korsbrekke, Knut; Fonn, Merete; Nilsen, Trygve; Kennedy, James; Nedreaas, Kjell H.; Thorsen, Anders; Withthames, Peter R.; Geffen, Audrey J.; Hoie, Hans and Kjesbu, Olav Sigurd: **Frequent skipped spawning in the world's largest cod population**

**Abstract:** Life-history theory suggests that animals may skip reproductive events after initial maturation to maximize lifetime fitness. In iteroparous teleosts, verifying past spawning history is particularly difficult; the degree of skipped spawning at the population level therefore remains unknown. We unequivocally show frequent skipped spawning in Northeast Arctic cod (NEAC) in a massive field and laboratory effort from 2006 to 2008. This was verified by postovulatory follicles in temporarily arrested ovaries close to the putative spawning period. At the population level, "skippers" were estimated to be approximately equally abundant as spawning females in 2008, constituting similar to 24% of the females 60-100 cm. These females never truly started vitellogenesis and principally remained on the feeding grounds when spawners migrated southward, avoiding any migration costs. The proximate cause of skipping seems to be insufficient energy to initiate oocyte development, indicating that skipped spawning may partly be a density-dependent response important in population regulation. Our data also indicate more skipping among smaller females and potential tradeoffs between current and future reproductive effort. We propose that skipped spawning is an integral life-history component for NEAC, likely varying annually, and it could therefore be an underlying factor causing some of the currently unexplained large NEAC recruitment variation. The same may hold for other teleosts. **PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA, 109 (23) 8995-8999, JUN 5 2012**

Ali, Alfatih and Kalisch, Henrik: **Mechanical Balance Laws for Boussinesq Models of Surface Water Waves**

**Abstract:** Depth-integrated long-wave models, such as the shallow-water and Boussinesq equations, are standard fare in the study of small amplitude surface waves in shallow water. While the shallow-water theory features conservation of mass, momentum and energy for smooth solutions, mechanical balance equations are not widely used in Boussinesq scaling, and it appears that the expressions for many of these quantities are not known. This work presents a systematic derivation of mass, momentum and energy densities and fluxes associated with a general family of Boussinesq systems. The derivation is based on a reconstruction of the velocity field and the pressure in the fluid column below the free surface, and the derivation of differential balance equations which are of the same asymptotic validity as the evolution equations. It is shown that all these mechanical quantities can be expressed in terms of the principal dependent variables of the Boussinesq system: the surface excursion eta and the horizontal velocity w at a given level in the fluid. **JOURNAL OF NONLINEAR SCIENCE, 22 (3), 371-398, JUN 2012**

Hodneland, Erlend; Ystad, Martin; Haasz, Judit; Munthe-Kaas, Antonella and Lundervold, Arvid: **Automated approaches for analysis of multimodal MRI acquisitions in a study of cognitive aging**

**Abstract:** In this work we describe an integrated and automated workflow for a comprehensive and robust analysis of multimodal MR images from a cohort of more than hundred subjects. Image examinations are done three years apart and consist of 3D high-resolution anatomical images, low
resolution tensor-valued DTI recordings and 4D resting state fMRI time series. The integrated analysis of the data requires robust tools for segmentation, registration and fiber tracking, which we combine in an automated manner. Our automated workflow is strongly desired due to the large number of subjects. Especially, we introduce the use of histogram segmentation to processed fMRI data to obtain functionally important seed and target regions for fiber tracking between them. This enables analysis of individually important resting state networks. We also discuss various approaches for the assessment of white matter integrity parameters along tracts, and in particular we introduce the use of functional data analysis (FDA) for this task. **COMPUTER METHODS AND PROGRAMS IN BIOMEDICINE, 106 (3), 328-341, JUN 2012**